Case Report

Foreign Body-Induced Brodie’s Abscess in the Calcaneus: A Rare Case Report

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Abstract

Our case demonstrates a unique differential diagnosis of a non-healing chronic ulceration following post curettage of a calcaneal bone cyst in a 72 year-old male with diabetes mellitus type 2. To our knowledge, there have not been any reported cases of this type of Brodie’s abscess. Literature suggests aggressive curettage and debridement with intravenous antibiotics to address the infection, with other surgical options consisting of packing the wound with bone graft once the infection has been eradicated. Our approach included applying powdered antibiotics with a bone substitute for local elucidation of antibiotic therapy in combination with long-term IV therapy for infection control. In addition, diabetic neuropathy can play a role in complications related to wound care and wound healing.

INTRODUCTION

Osteomyelitis historically has been categorized into acute, subacute, or chronic based on initial onset and presentation of the disease. Subacute osteomyelitis, which is any infection lingering between 2 and 6 months, may develop after a previously treated acute case of osteomyelitis, but can present in patients who have not had a previous history of an acute attack [1,2].

Brodie’s abscess is a form of subacute osteomyelitis, but due to the delay in diagnosis, the distinction between subacute and chronic osteomyelitis is often difficult to distinguish [1,3,4]. Sir Brodie first described a localized abscess that developed without prior systemic illness [1,4]. Subsequently, the term “Brodie’s abscess” is defined as a centrally placed, well-circumscribed bone abscess with a sclerotic wall [1]. In the literature, Staphylococcus aureus is the most commonly isolated organism, followed by Streptococcus species [1,3]. Brodie’s abscesses are commonly found in the lower extremity with the tibia accounting for a majority of the cases [1,4].

CASE PRESENTATION

A 73 year-old male with diabetes mellitus, hyperlipidemia and hypertension presented to an outpatient wound care center with a chronic, draining ulcer on the lateral aspect of the right foot that probed to bone (Figure 1). A focused lower extremity exam revealed palpable +2/4 dorsalis pedis and posterior tibial artery pulses with brisk capillary refill to all the digits of both feet. His neurologic assessment showed a decrease in protective sensation to both feet. He did not have any musculoskeletal deformities and the remainder of his physical exam was unremarkable.

The patient reported having surgery 2 years ago by another surgeon, which involved curettage of a calcaneal bone cyst with application of bone graft. While under the care of another practitioner, the patient received routine wound care with a home health nurse every three days. Prior to our surgical intervention, the wound was being managed on a once a week basis at a wound care center. Since the index surgery, there had been subsequent attempts at soft tissue infection and calcaneal bone debridement
with antibiotic impregnated bead placement. Despite multiple surgeries and rounds of intravenous antibiotics, the condition did not resolve (Figure 1).

He was admitted for a surgical work-up and planned intervention. This included a magnetic resonance imaging (MRI) study with contrast. Laboratory studies showed a white blood cell count that was within normal limits at 9.5, the hemoglobin A1c was 6.3, the C-reactive protein (CRP) and sedimentation rate (ESR) were elevated at 0.61 and 13, respectively. The MRI study revealed an enhancing area in the body of the calcaneus and contiguous with the lateral heel ulcer, measuring 5.5 x 3.1 x 3.6 cm, on the proton density, fat saturated images (Figures 2,3). The initial radiographic diagnosis was a Brodie’s abscess within the calcaneus with osteomyelitis.

A curvilinear incision was made superior to the chronic wound. Dissection was carried in standard layered fashion through dense scar tissue. Seropurulent material was encountered and the sinus tract from the wound was followed into the cavity within the calcaneus. During this process, a foreign body was removed from the calcaneal defect, which appeared to be a type of gauze dressing (Figures 4,5). Bone and wound cultures were taken and sent for evaluation. Thorough curettage of the calcaneal cavity was performed, followed by copious irrigation (Figure 6). Tobramycin and vancomycin powder was mixed with calcium phosphate cement, and under fluoroscopic guidance, the antibiotic cement mixture was injected into the calcaneus (Figure 7). Layered closure was performed and the patient was placed into a well-padded posterior splint (Figure 8).

Due to the chronicity and probe to bone characteristic of the wound, a clinical diagnosis of osteomyelitis was made, which was also supported by the MRI findings. The surgical cultures came back as methicillin-resistant *Staphylococcus aureus* (MRSA). The patient was treated with long-term intravenous antibiotics managed by infectious disease specialists. The pathology report showed that the soft tissue specimen obtained from the calcaneus was necrotizing granulomatous inflammation. The incision and chronic wound healed uneventfully within 2 months.

**DISCUSSION**

The most common clinical symptom is mild to moderate pain of an unknown onset that has been present for weeks or months, with insignificant or absent signs of infection. The patient is often found to be afebrile, with localized tenderness and swelling as the only physical sign of infection, much like this case [4]. Initial laboratory workup includes ESR, CRP, WBC and blood culture. Blood cultures are usually negative unless the patient has
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Figure 6 Intraoperative fluoroscopic image of the calcaneus after curettage and irrigation.

Figure 7 Intraoperative fluoroscopic image of the calcaneus after the antibiotic cement mixture was applied to fill in the defect and provide local antibiotics.

Figure 8 The chronic wound and the incision site completely healed within a couple of months.

Septicemia. Total WBC is often found normal to slightly elevated. Our patient presented with negative blood cultures, a normal WBC, and elevation of CRP and ESR. Combined elevation in ESR and CRP increase the sensitivity to nearly 98% for infection [1].

Diabetic neuropathy has been classified as a microvascular pathology through which the nerves of the periphery are not sufficiently nourished, causing a deficit in protective and epicritic sensation. Due in part to the denervation of the autonomic nervous system, the microcirculatory vessels in the foot begin to lose the ability to regulate the distribution of blood flow, which leads to hyperemic and anemic episodes that cause the damage to the bone and other soft tissues of the foot, inviting infection⁶. The neuropathic status of our patient most likely contributed to him not being aware of the gauze dressing being imbedded into the wound, exemplifying a complication that can be associated with diabetic neuropathy and wound care.

As literature has shown, the most effective imaging study for diagnosing osteomyelitis is the MRI, in which the Brodie’s abscess appears as a sharply-circumscribed “target” lesion [1]. The MRI study also helped show the extent of the infection, as well as aid in surgical planning. Brodie’s abscess can mimic benign and malignant diseases, which can lead to a misdiagnosis. Differential diagnosis include: fracture, unicameral bone cyst, osteoblastoma, osteosarcoma, aneurysmal bone cyst, Ewing’s sarcoma, multiple myeloma, osteoid osteoma, reticulosarcoma, chronic osteomyelitis, acute hematogenous osteomyelitis, and giant cell tumor [3]. In our case, the calcaneal Brodie’s abscess was caused by a foreign body that was walled off with a sinus tract leading to a focal wound, constituting this presentation as more of a contiguous form of osteomyelitis than the more common hematogenous presentation.

Because the patient underwent multiple surgical debridements and weekly local wound care prior to presenting to our clinic, there is uncertainty of how and when the gauze became lodged into the calcaneal defect. There is also the question of if the osteomyelitis was present before the foreign body instigated the Brodie’s abscess.

CONCLUSION

Our case demonstrates a unique differential diagnosis of a non-healing chronic ulceration following post curettage of a calcaneal bone cyst. The clinical presentation of a non-healing chronic ulceration warrants further investigation with radiological imaging. When a well-defined, well-circumscribed chronic bone abscess is visualized via MRI, there are multiple differential diagnoses to consider. We were able to rule out a high suspicion of a recurrence of the bone cyst when considering the clinical picture of the chronic wound and MRI findings.

The etiology of the Brodie’s abscess in this case presentation is also unique, and to our knowledge, there has not been a reported case. The presence of a foreign body with an associated, tracking wound suggests a contiguous form of osteomyelitis and cause for the Brodie’s abscess. In addition, literature has reported that the tibia was most commonly affected, with rare cases reported in the cuboid, talus and now calcaneus.

The literature that exists suggests aggressive curettage
and debridement with intravenous antibiotics to address the infection. Other surgical options include packing the defect with gauze packing and performing local wound care until the infection clears and applying cancellous bone 5 to 10 days after initial curettage once the infection was no longer present⁶. Our approach included applying powdered antibiotics with a bone substitute for local elucidation of antibiotic therapy in combination with long-term IV therapy for infection control, which can be another viable option in the treatment of Brodie’s abscess.

REFERENCES